Nizar Ben bouchta

Curriculum Vitae

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Work Experience

01/26–
Ongoing
Paris,France

PhD student, *Ecole Polytechnique / LIX*.
-Research on physics-aware generative models bridging neural rendering (NeRF/3DGS) and foundation generative models (diffusion/flow) for controllable 3D/4D content and interactive world models
-Developing geometric and physical anchoring mechanisms (explicit 3D representations, deformable/template models) to enforce spatio-temporal consistency, plausible deformations, and physically meaningful control
-Designing physics-informed training objectives (regularizers/constraints, differentiable rendering and inverse-physics signals) to reduce artifacts under user interactions (e.g., object manipulation, motion edits)
-Building evaluation protocols and benchmarks for physical plausibility, realism, and controllability, including synthetic data generation with physical ground truth and weakly-supervised real-world setups

09/24–11/25
Paris,France

Research engineer, *Université Paris-Cité/ INRIA*.
-Worked on KeOps. An open source library for efficiently computing reductions of large arrays
-Improved the compilation/linking process and expanded it to Apple Silicon chips (M1-M4)
-Implemented several new features within the library: LazyTensor slicing, full system sanity check function, CUDA memory allocation encapsulator, ...
-Coded and benchmarked KeOps implementations for different use cases: Multi-head attention, NUFFT, Sinkhorn algorithm, ...

03/23–08/24
Saclay,France

Research / MLOps engineer, *CEA LIST*.
- Worked on audio processing in the context of a european project on AI applications in security
- Explored new methods around audio representation learning (implicit neural representations), acoustic event classification, and more importantly optimal transport based multi-source audio domain adaptation
- Deployed quantized and pruned models on embedded Linux system (electronic card for real time audio event detection/classification)
- Benchmarked model inference on embedded system using several frameworks (TensorflowLite, Aidge, Pytorch)
- Presented a demo of the system at the Security Research Event in Brussels (October 2023) as part of the project

03/22–08/22
Rennes,France

Research internship, *Inria (MimeTIC team)*.
-Worked on 3D shape reconstruction with deep learning methods
-Processed 3D data (point clouds, meshes, surfaces, ...) and implemented testing pipelines with relevant metrics
-Proposed a new diffusion model/score matching based 3D reconstruction from sparse point clouds method

Projects

11/24–02/25
Paris, France

Demograd autograd engine.
- Built a minimal automatic differentiation engine and neural network library for educational purposes.
More details at: Demograd

10/20–03/21
Brest, France

BraTS UPenn challenge 2021, *IMT Atlantique /Inserm joint lab*.
- Proposed and implemented a combination of a normalizing flow based method to perform medical image super resolution and a U-Net based model for segmentation

Education

2018–2022

IMT Atlantique (ex Télécom Bretagne) - Engineering degree.
Coursework: Machine learning, Bayesian statistics, Signal processing, Empirical finance

2019–2020

Shanghai Jiao Tong University - Exchange semester.
Coursework: Object oriented programming, Probability theory, Information theory

Skills

Programming — Python, C++, Javascript, JAVA, SQL, Bash

Frameworks and Libraries — Pytorch, CUDA, ONNX, Scikit-learn, Matplotlib, PyVista, Ollama

MLOps	Git, Docker, WandB, MLFlow, Streamlit, Github Actions, Sphinx

Languages

French/Arabic	Bilingual
English	Fluent (IELTS grade: 7, C2 level)
Spanish	Fluent (B2 level)